

In the application of: Mehrotra et al.
Serial No. 10/606,482
Filed: June 26, 2003

RESPONSE ACCOMPANYING REQUEST FOR CONTINUED EXAMINATION

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REMARKS

Introduction

This paper accompanies the Request for Continued Examination filed on March 15, 2007 in the above-captioned patent application. By this paper, applicants fully respond to the pending FINAL Office Action mailed December 15, 2006. In this regard, claims 1-24, 29 and 35-54 stand cancelled so that claims 25-28 and 55 (applicants added new claim 55 by this paper) remain in the patent application. The discussion set forth below addresses the issues raised in the FINAL Office Action of December 15, 2006.

Further, a Supplemental Information Disclosure Statement accompanies the RCE wherein the Supplemental IDS cites documents to be made of record.

Applicants solicit the allowance of the pending claims in this patent application. Applicants point out that new claim 55 is claim 29 (indicated to contain allowable subject matter) rewritten in independent form.

Rejection of Claims 25-26, 28 and 30 under 35 USC §102(b)/35 USC §103(a)

Introduction

By the final Office Action of December 15, 2006, the Examiner has rejected claims 25-26, 28 and 30 under 35 USC §102(b)/35 USC §103(a) over Moriguchi et al. (U.S. Patent No. 5,296,008). Applicants disagree with the rejection for the reasons expressed below, and request the removal of the rejection and the allowance of the claims.

Applicants' Arguments

The claims under rejection are product-by-process claims. The Manual of Patent Examining Procedure reads at MPEP 2113 (Rev. 5 August 2006) page 2100-51:

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“[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend upon its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Applicants do not argue that the comparison is between the cutting insert of the claim and the cutting insert of Moriguchi et al. However, applicants submit that the Examiner has not provided, “... a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, ...”. See MPEP 2113 at page 2100-52. Because of this, the burden has not shifted to the applicants to come forward with evidence establishing the difference between the cutting insert of the claims and the cutting insert of Moriguchi et al. In fact, applicants submit that there are differences between the cutting insert of the claims and the Moriguchi et al. cutting insert.

It must be kept in mind that a principal concern of Moriguchi et al. is to address the task of forming a ceramic cutting tool insert with a directly sintered surface capable of functioning as a cutting edge without having to grind the insert to achieve its final shape. According to Moriguchi et al., grinding causes crack-inducing flaws and increases the manufacturing costs (see Col. 2, lines 19-32):

However, although it has been made possible to work a sintered body into a near final shape by the aforementioned technical development, there has not yet been developed a product of a silicon nitride tool or insert which is directly formed with a sintered surface capable of functioning as a cutting edge similarly to a cemented carbide or cermet tool formed with a directly

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coated sintered surface. Rather, a silicon nitride tool or insert requires grinding to obtain its finished shape under the present circumstances. Thus, the strength of the sintered body is reduced by cracks resulting from flaws which are caused during grinding, and the manufacturing cost is increased since silicon nitride is extremely hard to work making the grinding operation difficult. FIGS. 1A and 1B are microphotographs taken by a scanning electron microscope (hereinafter referred to as "SEM"), showing the state of a ground surface of a base material.

Further, Moriguchi et al. mentions a process of heat treating a silicon nitride powder compact wherein the result is the growth of crystals at the surface (Col. 2, line 59 through Col. 3, line 11). Moriguchi et al. then points out that such a ceramic cutting insert exhibits reduced wear resistance (Col. 3, lines 21-24 and 33-44):

When a sintered body having such a surface is used as a tool or insert, therefore, its wear resistance is reduced and its strength is deteriorated by the columnar crystal grains falling out of the body surface. ... When a sintered body having such surface phases is used as a tool, therefore, the cutting resistance is disadvantageously decreased and the coating film easily peels off to damage the effect of the coating. Such a problem is specific to a tool of a surface-coated silicon nitride sintered body which is improved in strength by columnar β -Si₃N₄ (or β' -SIALON), and is not observed in a film coated on a cemented carbide tool. Further, in a silicon nitride sintered body, this problem has not been caused since a ground sintered body has been coated in general.

Based upon the disclosure in Moriguchi et al., after realizing that disadvantages existed with either grinding the sintered ceramic cutting insert or sintering the pressed powder compact, Moriguchi et al. chose to subject the surface of the sintered ceramic cutting

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insert to a mechanical treatment. This mechanical treatment comprises blasting, barreling or ultrasonic vibration. At Col. 5, lines 31-35 Moriguchi et al. reads:

β -Si₃N₄ or β' -SIALON freely grown on the surface of the formed silicon nitride sintered body can be removed by any low cost method other than grinding. Such surface treatments comprise blasting, barreling, and a treatment through ultrasonic vibration.

Again according to Moriguchi et al., a mechanical surface treatment removed the columnar silicon nitride crystals (Col. 5, lines 47-54):

FIGS. 3A and 3B are SEM microphotographs showing the surface of a silicon nitride sintered body from which freely grown columnar silicon nitride particles have been removed by blasting, and FIGS. 4A and 4B are SEM microphotographs showing the surface of a silicon nitride sintered body from which freely grown columnar silicon nitride particles have been removed by barreling.

As best applicants can understand Moriguchi et al., the cutting insert of Moriguchi et al. has a consistent microstructure throughout the body of the cutting insert, and does not exhibit a surface region with a microstructure different from that of the interior region. This is different from the microstructure of the cutting insert of the claims.

The present specification establishes that the microstructure of the ground cutting insert is different from that of the ground and heat treated cutting insert. In this regard, at Paragraphs [0068]-[0069], the applications reads:

[0068] Analyses were performed to ascertain the phases present and surface morphology of the ground surface cutting inserts, the unground surface cutting inserts, and the ground and heat treated cutting inserts. Referring to FIGS. 2 and 3, it was found that the surface region of the ground surface cutting insert had grind lines and a relatively flattened

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structure. An X-ray diffraction analysis showed that the surface region of the ground surface cutting insert comprised only beta silicon nitride.

[0069] Referring to FIGS. 4 and 5, these photomicrographs show a mixture of ground surfaces and unground surfaces characterized by acicular grain structure. An X-ray diffraction analysis showed that the surface region of the ground and heat treated ground cutting insert has present a beta silicon nitride phase and a $Y_2Si_3O_3N_4$ phase.

Since the present specification shows a difference in the microstructure between the ground ceramic cutting insert and the ground and heat treated ceramic cutting insert, it is logical to take the position that there is a difference between the Moriguchi et al. cutting insert that has been subjected to a mechanical surface treatment¹ and the present ceramic cutting insert that has been ground and heat treated. The existence of this difference is confirmed by the text of Moriguchi et al. that states that freely grown columnar silicon nitride particles have been removed by the surface treatment.

There is a difference in the microstructure of the claimed ceramic cutting insert and the Moriguchi et al. cutting insert. Thus, the Moriguchi et al. cutting insert cannot be substantially identical to the claimed cutting insert. Moriguchi et al., cannot anticipate claim 25 under 35 USC §102(b) and the Patent Examiner has not met the burden of proof to establish a *prima facie* case of obviousness against claim 25 under 35 USC §103(a).

Claims 26, 28 and 30 each depend in one fashion or another from claim 25 and each claim is patentable for all of the reasons advanced in support of claim 25.

For the above reasons, applicants submit that the rejections lack merit and solicit the removal thereof along with the allowance of the claims.

¹ This is especially the case if the Examiner stands by the statement in the Office Action at page 3 that, "[M]origuchi et al. teaches that the ceramic cutting insert is subjected to surface treatment processes what are equivalent to grinding (col. 3, ln. 59-65, col. 5, ln. 31-35).

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Rejection of Claims 28 and 31-34 under 35 USC §103(a)

Introduction

By the Office Action, the Examiner has rejected claims 28 and 31-34 under 35 USC §102(b)/35 USC §103(a) over Moriguchi et al. in view of either Jindal (U.S. Patent No. 5,858,181) or Beeghly (U.S. Patent No. 5,628,590). Applicants disagree with the rejection for the reasons expressed below, and request the removal of the rejection and the allowance of the claims.

Applicant Arguments

Each one of the claims (i.e., claims 28 and 31-34) under this rejection depend from claim 25 in one fashion or another, and should be allowable for the reasons advanced in support of claim 25. Applicants submit that the rejections lack merit and solicit the removal thereof along with the allowance of the claims.

Rejection of Claims 25-28 and 31-34 under 35 USC §103(a)

Introduction

By the Office Action, the Examiner has rejected claims 25-28 and 31-34 under 35 USC §103(a) over Jindal. Applicants disagree with the rejection for the reasons expressed below, and request the removal of the rejection and the allowance of the claims.

Applicants' Arguments

As set forth above, claim 25 requires a heat treatment after grinding and Jindal does not teach or suggest this recitation. It is with hindsight in mind for the Examiner to argue (page 6 of the final Office Action) that:

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Regarding the limitation that the heat treatment is performed at the claimed temperature, it would have been within the purview of one ordinary skill in the art to have determined what temperatures would be necessary in order to sinter and/or hot isostatically press the cutting insert of Jindal to provide the insert with suitable strength and toughness properties.

Essentially, the Examiner argues that one can take a teaching of a 400°C step used to evaporate cleaning mixture prior to commencing a coating operation and transform it into a heat treating step that takes place at about 1300-2200°C. Applicants submit that it takes impermissible hindsight to take a heating step and more than triple the temperature, as well as apply the heat treatment for a different purpose, to arrive at the claimed cutting insert. MPEP 2142 (Rev 5 August 2006, page 2100-125 reads [in part], “The tendency to resort to ‘hindsight’ based upon applicant’s disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.”

In regard to claims 26-29 and 31-34, each one of these claims depends in one fashion or another from claim 25, and hence, is allowable for the reasons advanced in support of the allowance of claim 25.

For the above reasons, applicants submit that the rejections lack merit and solicit the removal thereof along with the allowance of the claims.

Comments on the Information Disclosure Statement

Along with the RCE, applicants have filed a Supplemental Information Disclosure Statement. Applicants believe that the claims are patentable over the documents

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submitted via the Supplemental IDS. Applicants' comments directed to some of the documents are set forth below.

Japanese Patent Publication 53-47415 appears to pertain to a translucent article wherein a heat treatment is carried out on a ground and cut translucent ceramic so as to produce extremely smooth surfaces. The purpose is to increase the efficiency of the optical transmittance of the translucent alumina ceramic. Such an article is different from a cutting insert as claimed in this patent application.

Japanese Patent Publication 04-136174, which is the applied Reference No. 1 in the Office Action from the Japanese Patent Office in the Japanese equivalent, has already been made of record in this case and an English translation supplied to the Examiner via the Information Disclosure Statement of August 4, 2003. Further, applicants point out that JP'174 limits the heat treatment of the ground matrix surface to between 1050°C and 1400°C. In reference to the upper limit, JP'174 says that if the temperature exceeds 1400°C, it causes a breakdown reaction in the SiAlON or silicon nitride that is the main component of the matrix with a resultant decrease in tool strength. Claim 24 recites that the heat treating of the ground ceramic cutting insert takes at a temperature between greater than 1400 degrees Centigrade and about 2200 degrees Centigrade. JP'174 does not address this temperature range.

According to the Delphion patent database, Japanese Patent Publication 7-232959 has U.S. Patent No. 5,538,926 to Tsuchida et al. as a family member. US'926 is cited via the Supplemental Information Disclosure Statement. According to the Delphion patent database, Japanese Patent Publication 3-505708 has U.S. Patent Nos. 4,959,331 and 4,965,231 as family members. Each one of these patent documents has already been made of record in this patent application. According to the Delphion patent database, Japanese Patent Publication 08-290309 has U.S. Patent Nos. 5,853,268 and 5,643,523 to

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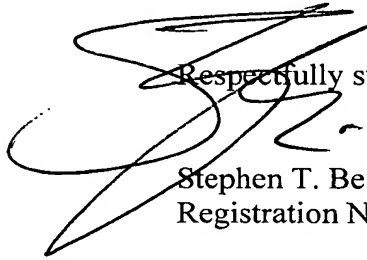
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Simpson as family members. US'268 and US'523 are cited via the Supplemental Information Disclosure Statement.

Conclusion

For the above reasons, applicants solicit the removal of the rejections and request allowance of the claims. If the Examiner disagrees with the above arguments, but has suggestions to place the claims in form for allowance, applicants urge the Examiner to contact the undersigned attorney (615-662-0100) or Mr. John J. Prizzi, Esq. (724-539-5331) to discuss the claims.

Respectfully submitted,



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